

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended) A substrate holding apparatus for holding a substrate and bringing it into contact with a polishing surface so that the substrate is subjected to polishing by causing relative movement between the substrate and the polishing surface, said apparatus comprising:

a substrate holder body having a substrate holding side facing the polishing surface and holding a substrate on said substrate holding side; ~~and~~

a retainer ring integrally formed with or fixedly secured to said substrate holder body on said substrate holding side, the retainer ring being arranged to surround an outer periphery of the substrate held by said substrate holder body so that the retainer ring engages with the polishing surface radially outside said substrate as the polishing of the substrate is effected; wherein said substrate holder body is provided on said substrate holding side with a membrane having opposite surfaces including inner and outer surfaces, the outer surface engaging with the substrate held by said substrate holder body, said substrate holder and said retainer ring cooperate to define an inner space, and said membrane is provided in said inner space;

a membrane support member provided in said inner space and connected to the outer periphery of said membrane and a flexible seal member connected between said membrane support member and said substrate holder body so that a fluid pressure chamber is defined by said membrane, said membrane support member, said flexible seal member and said substrate holder body; and

a drive shaft connected to said substrate holder body for rotating said substrate holder body while the substrate is kept urged against the polishing surface, said drive shaft being operable to urge the retainer ring against the polishing surface through said substrate holder body.

~~—said substrate holder body being provided on said substrate holding side with a membrane having opposite surfaces including inside and outside surfaces, the inside surface cooperating with a surface of said substrate holder body to define a fluid pressure chamber to which a fluid pressure is applied, the outer surface engaging with the substrate held by said substrate holder body.~~

Claims 2 and 3 (Cancel)

Claim 4 (Currently Amended) A substrate holding apparatus as set forth in claim 1 ~~3~~, wherein said membrane is provided with one or more through holes extending between said inner and outer surfaces thereof.

Claim 5 (Currently Amended) A substrate holding apparatus as set forth in claim 1 ~~3~~, wherein said apparatus further comprises a chucking plate positioned inside and connected to said membrane support member; and said chucking plate has opposite surfaces including an inner surface and an outer surface which is adjacent to said inner surface of said membrane and one or more through holes extending between said opposite surfaces thereof.

Claim 6 (Original) A substrate holding apparatus as set forth in claim 5, wherein said outer surface of said chucking plate is provided with one or more recesses fluidly connected to said through holes.

Claim 7 (Currently Amended) A substrate holding apparatus as set forth in claim 5, wherein said outer surface of said chucking plate has one or more raised or elevated portions each having a flat surface; said one or more through holes open ~~hole opens~~ at the flat surface; and said membrane is provided with one or more openings through which said elevated portions of said chucking plate are exposed to a substrate held on said outer surface of said membrane.

Claim 8 (Original) A substrate holding apparatus as set forth in claim 1, wherein said fluid pressure chamber is adapted to be selectively connected to a pressurized fluid source or a vacuum source.

Claim 9 (Original) A substrate holding apparatus as set forth in claim 1, wherein said retainer ring has an annular face having radially inner and outer edges and to be engaged with the polishing surface; and said annular face is provided with one or more grooves extending from said radially outer edge towards said radially inner edge.

Claim 10 (Original) A substrate holding apparatus as set forth in claim 9, wherein said grooves reach said radially inner edge.

Claim 11 (Original) A substrate holding apparatus as set forth in claim 9, wherein said grooves end short of said radially inner edge.

Claim 12 (Currently Amended) A substrate holding apparatus as set forth in claim 7, wherein said apparatus further comprises a conduit connecting said one or more through holes of said chucking plate to a vacuum source and a conduit connecting said fluid pressure chamber to a pressurized fluid source.

Claim 13 (Currently Amended) A substrate holding apparatus as set forth in claim 13, further comprising one or more pushers provided on said substrate holder body and arranged to engage with and urge said membrane support member towards the polishing surface.

Claim 14 (Currently Amended) A substrate holding apparatus for holding a substrate and bringing it into contact with a polishing surface so that the substrate is subjected to polishing by causing relative movement between the substrate and the polishing surface, said apparatus comprising:

a substrate holder body having a substrate holding side facing the polishing surface and holding a substrate on said substrate holding side;

a retainer ring integrally formed with or fixedly secured to said substrate holder body on said substrate holding side thereby forming an inner space defined by said substrate holder body and the retainer ring, the retainer ring being arranged to surround an outer periphery of the substrate to be held by said substrate holding apparatus so that the retainer ring engages with the polishing surface radially outside said substrate as the polishing of the substrate is effected;

a substrate support ring provided in said inner space and arranged to be sealingly engaged with the substrate to be held by said substrate holding apparatus; and

a flexible seal member sealingly connected between said substrate support ring and said substrate holder body so that a fluid pressure chamber is defined by said substrate holder body, said flexible seal member and the substrate to be engaged with said substrate support ring, said fluid pressure chamber being arranged to be selectively connected to a pressurized fluid source or a vacuum source.

Claim 15 (Original) A substrate holding apparatus as set forth in claim 14, further comprising one or more pushers provided on said substrate holder body and arranged to engage with and urge said substrate support ring towards the polishing surface.

Claim 16 (Currently Amended) A substrate polishing apparatus comprising:

a first polishing table having a hard polishing surface; and
a substrate holding apparatus for holding a substrate and bringing it into contact with said hard polishing surface, the substrate being subjected to polishing by causing relative movement between the substrate and the polishing surface;

said substrate holding apparatus comprising:

_____ a substrate holder body having a substrate holding side facing the polishing surface and holding a substrate on said substrate holding side; and

_____ a membrane provided on said substrate holding side of said substrate holder body, said membrane having opposite surfaces including inside and outside surfaces, the inside surface cooperating with a surface of said substrate holder body to define a fluid pressure chamber to which a fluid pressure is applied, and the outer side surface engaging with the substrate held by said substrate holder body;

wherein said hard polishing surface has a modulus of compression of 19.6 MPa (200kg/cm²) or more, wherein said hard polishing table is provided with fixed abrasives comprising abrasive particles and a binder binding said abrasive particles and the fixed abrasives provide said hard polishing surface.

Claims 17 and 18 (Cancel)

Claim 19 (Currently Amended) A substrate polishing apparatus as set forth in claim ~~16~~ 15, wherein said substrate holding apparatus further comprises a retainer ring integrally formed with or fixedly secured to said substrate holder body on said substrate holding side, the retainer ring being arranged to surround an outer periphery of the substrate held by said substrate holder body so that the retainer ring engages with the hard polishing surface radially outside said substrate as the polishing of the substrate is effected.

Claim 20 (Currently Amended) A substrate polishing apparatus as set forth in claim ~~16~~ 15, said apparatus further ~~including~~ includes a second polishing table having a soft polishing surface which is softer than said hard polishing surface of said first polishing table and said substrate holder body is arranged such that the substrate holder body holds a substrate, ~~can and~~; then; bring the substrate into contact with said hard polishing surface to effect a first polishing of the substrate and; thereafter; bring the substrate into contact with said soft polishing surface to effect a second polishing of the substrate.

Claim 21 (Currently Amended) A substrate polishing apparatus as set forth in claim 20, wherein said soft polishing surface has a smaller ~~less~~ modulus of compression than said hard polishing surface.

Claim 22 (Currently Amended) A substrate holding apparatus as set forth in claim ~~16~~ 15, wherein said retainer ring has an annular face having radially inner and outer edges and to be engaged with the polishing surface; and said annular surface is provided with one or more grooves extending from said radially outer edge towards said radially inner edge.

Claim 23 (Original) A substrate holding apparatus as set forth in claim 22, wherein said grooves reach said radially inner edge.

Claim 24 (Original) A substrate holding apparatus as set forth in claim 22, wherein said grooves end short of said radially inner edge.

Claim 25 (Currently Amended) A substrate polishing apparatus comprising:

a first polishing table having a hard polishing surface; and

a substrate holding apparatus for holding a substrate and bringing it into contact with said hard polishing surface, the substrate being subjected to polishing by causing relative movement between the substrate and the polishing surface;

said substrate holding apparatus comprising:

_____ a substrate holder body having a substrate holding side facing the polishing surface ~~and holding a substrate on said substrate holding side; and~~

_____ a substrate support member provided on said substrate holding side of said substrate holder body and arranged to be sealingly engaged with the substrate to be held by said substrate holding apparatus; and

a flexible seal member sealingly connected between said substrate support ring and said substrate holder member so that a fluid pressure chamber is defined by said substrate holder body, said flexible seal member and the substrate to be engaged with said substrate support member, said fluid pressure chamber being arranged to be selectively connected to a pressurized fluid source or a vacuum source;

wherein said hard polishing surface has a modulus of compression of 19.6 MPa (200kg/cm²) or more, wherein said hard polishing table is provided with fixed abrasives comprising abrasive particles and a binder binding said abrasive particles and the fixed abrasives provide said hard polishing surface.

Claims 26 and 27 (Cancel)

Claim 28 (Currently Amended) A substrate polishing apparatus as set forth in claim 25, wherein said substrate holding apparatus further comprises a retainer ring integrally formed with or fixedly

secured to said substrate holder body on said substrate holding side, the retainer ring being arranged to surround an outer periphery of the substrate to be held by said substrate holder body so that the retainer ring engages with the hard polishing surface radially outside the said substrate as the polishing of the substrate is effected.

Claim 29 (Currently Amended) A substrate polishing apparatus as set forth in claim 25, said apparatus further includes a second polishing table having a soft polishing surface which is softer than said hard polishing surface of said first polishing table; and; said substrate holder body is arranged such that the substrate holder body can hold ~~holds~~ a substrate ~~and~~, then; bring the substrate into contact with said hard polishing surface to effect a first polishing of the substrate, and; thereafter; bring the substrate into contact with said soft polishing surface to effect a second polishing of the substrate.

Claim 30 (Currently Amended) A substrate holding apparatus as set forth in claim ~~28~~ 25, wherein said retainer ring has an annular face having radially inner and outer edges and to be engaged with the polishing surface; and said annular surface is provided with one or more grooves extending from said radially outer edge towards said radially inner edge.

Claim 31 (Original) A substrate holding apparatus as set forth in claim 30, wherein said grooves reach said radially inner edge.

Claim 32 (Original) A substrate holding apparatus as set forth in claim 30, wherein said grooves end short of said radially inner edge.

Claim 33 (Currently Amended) A substrate holding apparatus for holding a substrate during a polishing operation of the substrate, said substrate holding apparatus comprising:

 a substrate holder body;

 a retainer ring integrally formed with or fixedly secured to said substrate holder body; and

a flexible membrane having inner and outer surfaces ~~surface~~ and arranged inside the retainer ring in such a manner that the inner surface cooperating with the substrate holder body to define a fluid chamber therebetween, the outer surface providing a substrate holding surface for holding the substrate; wherein said substrate holder body and said retainer ring cooperate to define an inner space and said membrane is provided in said inner space;

a membrane support member which is provided in said inner space and connected to the outer periphery of said membrane and a flexible seal member connected between said membrane support member and said substrate holder body so that a fluid pressure chamber is defined by said membrane, said membrane support member, said flexible seal member and said substrate holder body;

wherein the substrate to be held by the substrate holding surface is urged against a polishing surface by a fluid pressure supplied into the fluid pressure chamber; and

a drive shaft connected to said substrate holder body for rotating said substrate holder body while the substrate is kept urged against the polishing surface, said drive shaft being operable to urge the retainer ring against the polishing surface through said substrate holder body.

Claim 34 (Cancel)

Claim 35 (Currently Amended) A substrate holding apparatus as set forth in claim 33, further comprising an air cylinder for applying a force to urge the retainer ring against the polishing surface through said ~~the~~ substrate holder body.

Claim 36 (Currently Amended) A substrate holding apparatus for holding a substrate during a polishing operation of the substrate, said substrate holding apparatus comprising:

a substrate holder body holding a substrate; and

a retainer ring provided on an outer periphery of said ~~the~~ substrate holder body so that the substrate to be held by the substrate holder body is positioned radially inside the retaining ring, said ~~the~~ retainer ring having an annular surface to be engaged with a polishing surface radially outside the substrate when the substrate is brought into contact with the polishing surface for polishing of the

substrate, the annular surface having radially outer and inner peripheral edges and a groove extending from the radially outer peripheral edge towards the radially inner peripheral edge:-

wherein the groove ends short of the radially inner peripheral edge.

Claim 37 (Cancel)